BROCADE DCX 8510 BACKBONE FAMILY



DATA CENTER

A Foundation for Server Virtualization, Flash Storage, and Cloud Architectures

HIGHLIGHTS

- Maximizes performance for I/O and bandwidth-intensive applications with unmatched scalability, performance, and reliability
- Utilizes Brocade UltraScale chassis connectivity for simpler, flatter, low-latency fabrics
- Optimizes data center connectivity over distance with integrated high-performance metro and global connectivity
- Leverages Brocade Fabric Vision technology's powerful monitoring, management, and diagnostic tools to simplify administration, increase uptime, and reduce costs
- Helps pinpoint problems faster and simplify SAN configuration and management

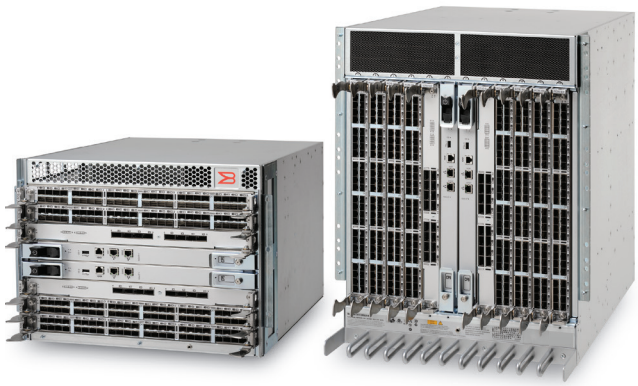
Gen 5 Fibre Channel is the purpose-built, data center-proven network infrastructure for storage, delivering unmatched reliability, simplicity, and 16 Gbps performance. The Brocade DCX 8510 with Gen 5 Fibre Channel and Brocade Fabric Vision technology unleashes the full potential of high-density server virtualization, cloud architectures, and next-generation storage.

Brocade® DCX® 8510 Backbones are the industry's most reliable, scalable, and high-performance Gen 5 Fibre Channel switching infrastructure for mission-critical storage. They are designed to increase business agility while providing non-stop access to information and reducing infrastructure and administrative costs.

Networks need to evolve in order to support the growing demands of highly virtualized environments, new flash-based storage, and private cloud architectures. Fibre Channel, the de facto standard for storage networking, is evolving with the data center. Brocade DCX 8510 Backbones with Gen 5 Fibre Channel deliver a new level of scalability and advanced capabilities to this robust, reliable, and high-performance technology. This enables organizations to continue leveraging their existing IT investments as they grow their businesses. In addition, they can consolidate their Storage Area Network (SAN) infrastructures to simplify management and reduce operating costs.

MAXIMUM FLEXIBILITY AND RELIABILITY

Brocade DCX 8510 Backbones are available in two modular form factors. Built for large enterprise networks, the 14U Brocade DCX 8510-8 has eight vertical blade slots to provide up to 512 16 Gbps Fibre Channel ports. Built for midsize networks, the 8U Brocade DCX 8510-4 has four horizontal blade slots to provide up to 256 16 Gbps Fibre Channel ports. The Brocade DCX 8510 family supports 2, 4, 8, 10, and 16 Gbps Fibre Channel, FICON®, and 1/10 Gbps Fibre Channel over IP (FCIP).



BROCADE

To help minimize downtime costs, Brocade DCX 8510 Backbones build upon years of innovation and leverage the core technology of Brocade systems performing at greater than 99.999 percent uptime in the world's most demanding data centers.

SIMPLIFIED SCALE-OUT NETWORK DESIGN

Networks are evolving in order to adapt to rapid growth and change in the server and storage infrastructure. Brocade UltraScale chassis connectivity leverages optical Inter-Chassis Links (ICLs) of up to 100 meters to connect up to 10 Brocade DCX 8510 Backbones, enabling flatter, faster, and simpler fabrics that increase consolidation while reducing network complexity and costs.

UltraScale ICLs enable scalable core-edge and active-active mesh chassis topologies. These high-density chassis topologies reduce inter-switch cabling by 75 percent and free up to 25 percent of ports for server and storage. This maximizes overall port density in the lowest amount of rack space.

SIMPLIFIED MANAGEMENT AND ROBUST NETWORK ANALYTICS

Brocade Fabric Vision technology provides a breakthrough hardware and software solution that helps simplify monitoring, maximize network availability, and dramatically reduce costs. Featuring innovative monitoring, management, and diagnostic capabilities, Fabric Vision technology enables administrators to avoid problems before they impact operations, helping their organizations meet Service Level Agreements (SLAs). Fabric Vision technology includes:

- **Monitoring and Alerting Policy Suite (MAPS):** Provides a pre-built, policy-based threshold monitoring and alerting tool that simplifies fabric-wide threshold configuration and actions. Administrators can configure multiple fabrics at one time using pre-defined or customized rules and policies for specific ports or switch elements.

- **Fabric Performance Impact (FPI) Monitoring:** Uses pre-defined thresholds and alerts in conjunction with MAPS to automatically detect and alert administrators to severe levels of latency and identifies slow drain devices that might impact the network. This feature uses advanced monitoring capabilities and intuitive MAPS dashboard reporting to indicate various latency severity levels, pinpointing exactly which devices are causing or impacted by a bottlenecked port.

- **Dashboards:** Provides integrated dashboards that display an overall SAN health view, along with details on out-of-range conditions, to help administrators easily identify trends and quickly pinpoint issues occurring on a switch or in a fabric.

- **Brocade ClearLink Diagnostics:** Ensures optical and signal integrity for Gen 5 Fibre Channel optics and cables, simplifying deployment and support of high-performance fabrics. ClearLink Diagnostic Port (D_Port) is an advanced capability of Gen 5 Fibre Channel platforms.

- **Flow Vision:** Enables administrators to identify, monitor, and analyze specific application flows in order to simplify troubleshooting, maximize performance, avoid congestion, and optimize resources. Flow Vision includes:

  – **Flow Monitor:** Provides comprehensive visibility into flows within the fabric, including the ability to automatically learn flows and non-disruptively monitor flow performance. Administrators can monitor all flows from a specific host to multiple targets/LUNs, from multiple hosts to a specific target/LUN, or across a specific ISL. Additionally, they can perform LUN-level monitoring of specific frame types to identify resource contention or congestion that is impacting application performance.

  – **Flow Generator:** Provides a built-in traffic generator for pre-testing and validating the data center infrastructure—including route verification and integrity of optics, cables, ports, back-end connections, and ISLs—for robustness before deploying applications.

- **Forward Error Correction (FEC):** Enables recovery from bit errors in ISLs, enhancing transmission reliability and performance.

- **Credit Loss Recovery:** Helps overcome performance degradation and congestion due to buffer credit loss.

UNMATCHED MAINFRAME TECHNOLOGY INNOVATION AND LEADERSHIP

The Brocade DCX 8510 matches the highest-performing and most reliable FICON infrastructure with the industry's fastest and most scalable System z mainframes. Brocade builds on more than 25 years of mainframe leadership that includes designing the FICON standard and authoring many FICON patents.

BROCADE NETWORK ADVISOR

Brocade Network Advisor simplifies Gen 5 Fibre Channel management and helps users proactively diagnose and resolve issues to maximize uptime, increase operational efficiency, and reduce costs. The wizard-driven interface dramatically reduces deployment and configuration times by allowing fabrics, switches, and ports to be managed as groups. Customizable dashboards graphically display performance and health indicators out of the box, including all data captured using Brocade Fabric Vision technology. To accelerate troubleshooting, administrators can use dashboard playback to quickly review past events and identify problems in the fabric. In addition, dashboards and reports can be configured to show only the most relevant data, enabling administrators to more efficiently prioritize their actions and maintain network performance.

OPTIMIZED DATA CENTER CONNECTIVITY OVER DISTANCE

Connecting distributed data centers enables data mobility for advanced data protection solutions. Brocade DCX 8510 Backbones include integrated metro and global SAN extension that provides application agility and flexible business continuity and disaster recovery solutions.

The Brocade DCX 8510 family enables high-speed replication and backup solutions over metro or WAN links with native Fibre Channel (10/16 Gbps) and optional FCIP (1/10 GbE) extension support. Extending Brocade Fabric Vision technology between data centers enables organizations to move more data faster and minimize the impact of disruptions and outages for non-stop business operations. The integrated metro connectivity includes in-flight compression and encryption to optimize bandwidth and minimize the risk of unauthorized access.

INDUSTRY-LEADING PERFORMANCE

Emerging and evolving critical workloads and higher density virtualization are continuing to push the limits of SAN infrastructure. The Brocade DCX 8510 features industry-leading Gen 5 Fibre Channel that provides 16 Gbps line-speed performance and up to 10.2 Tbps of chassis bandwidth with the FC16-64 high-density blade connectivity option to address next-generation I/O- and bandwidth-intensive applications.

Brocade DCX 8510 Backbones provide unmatched chassis, slot-to-slot, and port performance and bandwidth. In addition, local switching capabilities ensure that data traffic within the same port group does not consume slot bandwidth, maximizing the number of line-rate ports. Performance capabilities include:

- Brocade DCX 8510-8:
  - Up to 512 ports (equivalent to 640 with UltraScale ICLs) at 16 Gbps
    - 10.2 Tbps chassis bandwidth
    - 8.2 Tbps Fibre Channel ports
    - 2.0 Tbps UltraScale ICL bandwidth
  - 512 Gbps bandwidth per slot
- Brocade DCX 8510-4:
  - Up to 256 ports (equivalent to 320 with UltraScale ICLs) at 16 Gbps
    - 5.1 Tbps chassis bandwidth
    - 4.1 Tbps Fibre Channel ports
    - 1 Tbps UltraScale ICL bandwidth
  - 512 Gbps bandwidth per slot

BROCADE GLOBAL SERVICES

Brocade Global Services has the expertise to help organizations build scalable, efficient cloud infrastructures. Leveraging 15 years of expertise in storage, networking, and virtualization, Brocade Global Services delivers world-class professional services, technical support, and education services, enabling organizations to maximize their Brocade investments, accelerate new technology deployments, and optimize the performance of networking infrastructures.

MAXIMIZING INVESTMENTS

To help optimize technology investments, Brocade and its partners offer complete solutions that include professional services, technical support, and education. For more information, contact a Brocade sales partner or visit www.brocade.com.

BROCADE DCX 8510 BACKBONE SPECIFICATIONS

Systems Architecture	
Chassis	Single chassis: Up to 512 (Brocade DCX 8510-8) or 256 (Brocade DCX 8510-4) 16 Gbps (E, F, D, M, and EX) Fibre Channel ports using 64-port 16 Gbps Fibre Channel blades. Multi-chassis with UltraScale ICL ports: Up to 6,144 16 Gbps Fibre Channel ports; UtraScale ICL ports (32 or 16 per chassis, optical QSFP) connect up to nine chassis in a full mesh topology or up to 12 chassis in a core-edge topology. Each Brocade DCX 8510 chassis that connects to four or more Brocade DCX 8510 chassis via UltraScale ICLs requires an Enterprise ICL license.
Control processor	Redundant (active/standby) control processor modules
Scalability	Full fabric architecture of 239 switches
Certified maximum	6,000 active nodes; 56 switches, 19 hops in Brocade Fabric OS® fabrics; 31 switches, larger fabrics certified as required
Special-purpose blades	Brocade FX8-24 Extension Blade provides SAN extension over IP networks (12 8 Gbps Fibre Channel ports, 10 1 GbE ports with license option for up to two 10 GbE ports per blade; up to four blades). Brocade FCOE10-24 Blade provides Fibre Channel over Ethernet (FCoE) and Data Center Bridging (DCB) for end-of-row server connectivity, delivering line-rate 10 Gbps performance across 24 ports.
Performance	Fibre Channel: 2.125 Gbps line speed, full duplex; 4.25 Gbps line speed, full duplex; 8.5 Gbps line speed, full duplex; 10.53 Gbps line speed, full duplex; 14.025 Gbps line speed, full duplex; auto-sensing of 2, 4, 8, and 16 Gbps port speeds; 10 Gbps and optionally programmable to fixed port speed
ISL trunking	Frame-based trunking with up to eight 16 Gbps ports per ISL trunk; up to 128 Gbps per ISL trunk Exchange-based load balancing across ISLs with DPS included in Brocade Fabric OS
Chassis bandwidth	Brocade DCX 8510-8: 10.2 Tbps per chassis (512 ports × 16 Gbps data rate + 2.048 Tbps UltraScale ICL bandwidth) Brocade DCX 8510-4: 5.1 Tbps per chassis (256 ports × 16 Gbps data rate + 1.024 Tbps UltraScale ICL bandwidth)
Slot bandwidth	512 Gbps (data rate)
Local switching bandwidth	512 Gbps for Brocade FC16-32: 32 ports × 16 Gbps (data rate) 768 Gbps for Brocade FC16-48: 48 ports × 16 Gbps (data rate) 1,024 Gbps for Brocade FC16-64: 64 ports × 16 Gbps (data rate)
UltraScale ICL bandwidth	Brocade DCX 8510-8: 2.048 Tbps; 32 UltraScale ICL ports provide the equivalent of 128 16 Gbps ports. Each UltraScale ICL port provides 64 Gbps bandwidth over a QSFP (4×16 Gbps) link. Brocade DCX 8510-4: 1.024 Tbps; 16 UltraScale ICLs provide the equivalent of 64 16 Gbps ports. Each UltraScale ICL port provides 64 Gbps bandwidth over a QSFP (4×16 Gbps) link. Both models: Frame-based trunking is enabled between four UltraScale ICLs. DPS distributes exchanges across all frame trunks.
Switch latency	Locally switched port latency is 700 ns; blade-to-blade latency is 2.1 µsec; encryption/compression is 5.5 µsec per node; Forward Error Correction (FEC) adds 400 ns between E_Ports (enabled by default).
Maximum frame size	2,112-byte payload
Frame buffers	8,192 per 16-port group on 32-port and 64-port blades and up to 8,192 per 24-port group on 48-port blades, dynamically allocated
Classes of service	Class 2, Class 3, Class F (inter-switch frames)
Fibre Channel port types	D_Port (ClearLink Diagnostic Port), E_Port, EX_Port, F_Port, M_Port (Mirror Port); optional port type control
Data traffic types	Fabric switches supporting unicast
Media types	16 Gbps: Brocade FC16-64 requires Brocade hot-pluggable QSFP connector; 4×16 Gbps SWL, MPO 1×12 ribbon cable connector (66 m OM3, 100 m OM4); FC16-64 QSFPs support only 4/8/16 Gbps (not 2 Gbps or 10 Gbps) 16 Gbps: Brocade FC16-32 and -48 require Brocade hot-pluggable SFP+, LC connector; 16 Gbps SWL, LWL, ELWL 10 Gbps: Brocade FC16-32 and -48 require Brocade hot-pluggable SFP+, LC connector; 10 Gbps SWL, LWL; Brocade FCOE10-24 requires hot-pluggable, Brocade 10 GbE SFP+ with any combination of Short-Reach (SR) and Long-Reach (LR) optical transceivers 8 Gbps: Brocade FC16-32 and -48; Brocade FX8-24; and Brocade FS8-18 blades require Brocade hot-pluggable SFP+, LC connector; 8 Gbps SWL, LWL, ELWL 8 Gbps: Brocade FC8-64 blades require Brocade hot-pluggable mSFP, mSFP LC connector; 8 Gbps SWL only UltraScale ICL QSFP: Brocade CR16-8 and CR16-4 require Brocade hot-pluggable QSFP, MTP connector; 4×16 Gbps SWL (50 m OM3, 100 m OM4, and 2 km QSFP for long distances) Fibre Channel distance subject to fiber-optic cable and port speed
USB	1 USB port per control processor for firmware download, support save, and configuration upload/download

BROCADE DCX 8510 BACKBONE SPECIFICATIONS (CONTINUED)

Fabric services	Brocade Fabric Vision technology; Monitoring and Alerting Policy Suite (MAPS); Flow Vision; Brocade Advanced Performance Monitoring (APM) (including Top Talkers for E_Ports, F_Ports, and Fabric mode); Brocade Adaptive Networking (Ingress Rate Limiting, Traffic Isolation, QoS); Bottleneck Detection; Brocade Advanced Zoning (default zoning, port/WWN zoning, broadcast zoning); Dynamic Fabric Provisioning (DFP); Dynamic Path Selection (DPS); Brocade Extended Fabrics; Enhanced BB credit recovery; Brocade Fabric Watch; FDMI; Flow Vision; Frame Redirection; Frame-based Trunking; FSPF; Integrated Routing; IPoFC; Brocade ISL Trunking; Management Server; Monitoring and Alerting Policy Suite (MAPS); NPIV; NTP v3; Port Fencing; Registered State Change Notification (RSCN); Reliable Commit Service (RCS); Brocade Server Application Optimization (SAO); Simple Name Server (SNS); Virtual Fabrics (Logical Switch, Logical Fabric)
Extension	Supports DWDM, CWDM, and FC-SONET devices; Fibre Channel, in-flight compression (Brocade LZO) and encryption (AES-GCM-256) BB credit recovery; FCIP, Adaptive Rate Limiting (ARL), data compression, Fast Write, read/write Tape Pipelining, QoS
FICON	FICON cascading (Brocade Fabric OS: Brocade DCX 8510-8, DCX 8510-4); support for lossless DLS; FICON CUP; Advanced Accelerator for FICON (FICON Global Mirror and XRC emulation and read/write Tape Pipelining). The Brocade FC8-64 and FC16-64 blades must be in a logical switch that is not being used for FICON connections; they do not support FICON.

High Availability	
Architecture	Passive backplane; redundant active/passive control processor; redundant active/active core switching blades; redundant WWN cards
Chassis power	Two 2000 W AC power supply modules (100 to 240 V auto-sensing), 2N redundancy; Brocade DCX 8510-8 supports two additional power modules
Cooling	Brocade DCX 8510-8: Three blower assembly modules (two required for operation) Brocade DCX 8510-4: Two blower assembly modules (one required for operation)
Solution availability	Designed to provide 99.999 percent uptime capabilities; hot-pluggable redundant power supplies, fans, WWN cards, processors, core switching, port blades, and optics; online diagnostics; non-disruptive firmware download and activation

Management	
Management	HTTP, SNMP v1/v3 (FE MIB, FC Management MIB), SSH; Auditing, Syslog; Brocade Advanced Web Tools, Brocade Network Advisor SAN Enterprise or Brocade Network Advisor SAN Professional Plus; Command Line Interface (CLI); SMI-S compliant; Administrative Domains; trial licenses for add-on capabilities
Security	AES-GCM-256 encryption on ISLs; DH-CHAP (between switches and end devices), FCAP switch authentication; FIPS 140-2 L2-compliant, HTTPS, IPsec, IP filtering, LDAP with IPv6, OpenLDAP, Port Binding, RADIUS, User-defined Role-Based Access Control (RBAC), Secure Copy (SCP), Secure RPC, SFTP, SSH v2, SSL, Switch Binding, TACACS+, Trusted Switch
Management access	10/100/1000 Ethernet (RJ-45) per control processor, in-band over Fibre Channel; serial port (RJ-45) and one USB per control processor module; call-home integration enabled through Brocade Network Advisor
Diagnostics	Built-in flow generator, ClearLink optics and cable diagnostics, including electrical/optical loopback, link traffic/latency/distance; POST and embedded online/offline diagnostics, including environmental monitoring, FCping and Pathinfo (FC traceroute), flow mirroring, frame viewer, non-disruptive daemon restart, port mirroring, optics health monitoring, power monitoring (16 Gbps blades-only), RAStrace logging, and Rolling Reboot Detection (RRD)

Mechanical Specifications	
Enclosure	Rear panel-to-door airflow; Brocade DCX 8510-4 ships with 1U exhaust shelf
Mounting	Rack-mountable in a standard 19-inch EIA cabinet
Size	Brocade DCX 8510-8 Width: 43.74 cm (17.22 in.) Height: 62.23 cm (24.50 in., 14U) Depth (without door): 61.29 cm (24.13 in.) Depth (with door): 73.20 cm (28.82 in.) Brocade DCX 8510-4 Width: 43.74 cm (17.22 in.) Height: 35.60 cm (14 in., 8U) plus 4 cm exhaust shelf (1.75 in, 1U) Depth without door: 61.29 cm (24.13 in.) Depth with door: 73.20 cm (28.82 in.)
System weight	Brocade DCX 8510-8 103.38 kg (227.9 lb) for 512-port configuration fully populated 37.30 kg (82.20 lb) for chassis Brocade DCX 8510-4 69 kg (152 lb) for 256-port configuration fully populated 25.4 kg (56 lb) for chassis

BROCADE DCX 8510 BACKBONE SPECIFICATIONS (CONTINUED)

Environment	
Temperature	Operating: 0°C to 40°C (32°F to 104°F) Non-operating: –25°C to 70°C (–13°F to 158°F)
Humidity	Operating humidity: 5% to 93% RH non-condensing at 40°C (104°F) with a maximum gradient of 10% per hour Non-operating humidity: 10% to 93% RH non-condensing at 70°C (158°F)
Altitude	Up to 3000 meters (9842 feet)
Shock	Operating: 20 g, 6 ms, half sine Non-operating: 33 g, 11 ms, half sine
Vibration	Operating: 0.5 g p-p, 5 to 500 Hz Non-operating: 2.0 g p-p, 5 to 500 Hz
Heat dissipation	Brocade DCX 8510-8 512-port configuration: 7,462 BTU/hr Brocade DCX 8510-4 256-port configuration: 4,182 BTU/hr
CO_2 emissions	Brocade DCX 8510-8 8.9 metric tonnes per year (max: with 384 ports using 8 48-port blades) Brocade DCX 8510-4 4.9 metric tonnes per year (max: with 192 ports using 4 48-port blades)

Power	
Supported power range	Voltage Range: 85 to 264 VAC Auto-volt Nominal: 100 to 240 VAC Power 85 to 132 VAC: 1000 W 180 to 264 VAC: 2000 W
In-rush current	60 Amps maximum, peak
Frequency	47 to 63 Hz (Nominal: 50 to 60 Hz)

For information about supported SAN standards, visit www.brocade.com/sanstandards.

For information about switch and device interoperability, visit www.brocade.com/interoperability.

For information about hardware regulatory compliance, visit www.brocade.com/regulatorycompliance.

Corporate Headquarters
San Jose, CA USA
T: +1-408-333-8000
info@brocade.com

European Headquarters
Geneva, Switzerland
T: +41-22-799-56-40
emea-info@brocade.com

Asia Pacific Headquarters
Singapore
T: +65-6538-4700
apac-info@brocade.com

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